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Containers for the inshore fishery. Denmark's first
fishing vessel fitted for container cargo

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CONTAINERS FOR INSHORE FISHERY

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CONTAINERS FOR THE INSHORE FISHERY

Denmark's first fishing vessel fitted for container cargo

By cand.scient.

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From 1960 to 1982 the amount of full-time fishermen decreased by 36%, from 13,500 to 8,700. This decrease took place in the inshore fishery, as can be seen from the 38% decrease in the amount of the boats in the 5-15 BRT group in the same timespan, during which the numbers dropped from 2,146 to 1,336. Contrary to this, however, was an increase in the number of boats over 15 BRT. The decrease took place in ^{the coastal} Danish waters.

At the same time increased of nutritive salts to the coastal marine waters have led to a phenomenal increase in algae, which has made it almost impossible to carry out net fishing during the summer months; in addition bottom netting has also been adversely affected. The small hauls are unfortunately of varied quality, resulting in unprofitable fishing.

Consequently there has been a migration from the industry, a migration which often took place in areas which already had a lack of employment.

In DFT (Dansk Fiskeri Tidende) no. 24 World Fishing edition from June of this year, a special project is referred to, which deals with fishing vessels carrying insulated containers.

The goal of this new project is to improve the handling of the inshore fishing catch, thereby making it possible to run an economical fishing industry from the small harbours and docks across the country.

For this experiment Dueholms DM Sea Rover was selected, because the wheel house is built in front of the boat. This feature provides a large working area on deck and simultaneously creates a hull shape, which gives a good utilization of the hold. In addition the ship building yard was interested in participating in this aspect of developement. Supported by research fisheries grants supplied by the Ministry of Fisheries, the building of this new vessel was started in March of this year.

The standard type of the DM Sea Rover is 9.30 m long and 3.30 m wide. It has a fairly large well in the front of the ship and a smaller hold at the rear. In the "container" model the well is removed, the motor moved forward and a large container-well placed amidships.

As Metas produces containers of three different sizes, which in varied combinations suit the Euro-palle, this measurement (1200 X 800) became a determining factor for the fitting of the hold and the well. The three sizes are: 70 L, 200 L and 450 L, and in order to test which size was best suited for this type of vessel, containers of all the three types were delivered.

The container well was constructed with a surface which could hold 3 pallets. In order to prevent water from penetrating, the well was cast in one piece together with the deck.

To make it possible for the ship to handle containers on its own, an A-mast in light alloy metal was manufactured and mounted behind the wheel house. On the mast, a derrick was installed with a

hydraulic winch.

In order to facilitate and speed up the dressing of the fish, a combined cleaning table and rinsing basin was constructed. It was made out of aluminium and placed on the port side.

HOW DOES THE EXPERIMENT VESSEL PERFORM

After completion of the fitting in April, Hvide Sande was selected as the vessel's home harbour. In the period from May until September, the fishing was monitored on board. In the first period they fished for sole with gillnet, and later on in July/August they trawled for plaice and dabs.

For the most part of the research period, the container capacity consisted of one 450 l, two 200 l, and four 70 l containers. The 400 l container was used to store ice, enough to keep 1600-1800 kg at 0°C, which by far exceeded the average haul. In this way ice could be brought along for several trips and kept 2-3 weeks without melting.

QUICK COOLING

The new quick cooling system was used exclusively on the research vessel, i.e., one of the empty containers was filled approximately 1/3 full with ice. The ice was mixed with seawater, and the fish was poured directly into this "mixture". This icing method has proven very efficient. It provides a cooling method which is at least 5 times faster than ordinary crate icing. This is due to the fact that all the fish are ^{100 %} surrounded by icecold water.

HANDLING OF THE CATCH IN NET FISHERY

Normally sole fishing is carried out by boats which leave just before sunset to set their nets. The nets are pulled in the early morning and the boats then return to the harbour. Here the nets are disentangled and the fish removed. They are then cleaned before they are weighed for the collection centre. At the collection centre they are iced in crates. Often eight hours or more will elapse before the catch is iced.

Although the nets are brought back to the harbour on deck of the new vessels, still the new container system makes it possible to shorten the timespan as much as 40% from the time the fish arrive on the deck until they are cleaned and cooled to 0°C, because the icing method is incredibly efficient.

One idea, which was not tested, was hauling the net with the catch and storing them directly into the iced containers. By using this method the catch can be cooled immediately and kept cold until such time when the catch can be removed from the nets.

TRAWLING

As the sole season finished by the end of June, it was decided to change from net fishing to trawling. The selfhauler was removed, and a small trawl winch was installed on the quarterdeck. A regular haul was of 2-3 hours' duration; plaice, dab and sole were fished.

During the trawling, the derrick proved to be very useful when the catch was pulled in.

THE DRESSING TABLE FACILITATES CLEANING AND RINSING

During the net fishing the fish are removed from the nets and placed in baskets on top of the deck, sorted out according to species and size. After this, each type of fish is placed on the dressing table and cleaned. During the trawling the rinsing basin acted as a receiving box. From here the catch was sorted out in baskets, according to species and size. As in net fishing, each category is poured out on the dressing table, cleaned and transferred to the rinsing basin.

The dressing table was at a comfortable height for working and in this way it was not necessary to bend down for each fish, thus reducing the strain on one's back. All in all the dressing table made it easier and faster to clean the fish.

In the rinsing boxes the fish that are already cleaned are washed with hose. The slanted bottom of the basin adds to the rinsing of the fish; as the ship moves, it gets swished around and thereby receives a good rinsing.

From the rinsing basin the catch is released into a basket on the deck, and the fish are then ready to be iced.

COOLING

As mentioned, the quick cooling system was used exclusively during the research period: Normally each container is filled with 1/3 ice and sea water; this way a soup mixture is made, into which the fish are poured. In the instances where large hauls were made,

i.e. where a container was filled at once, it was necessary to alternate ice and fish, and at the end add extra sea water, if necessary.

It is important to keep the fish floating, so that no bruising occurs, but on the other hand ice is wasted if too much water is added. It should also be noted that a great deal of melt water can result because of the heat that is transferred from the fish to the ice.

Cargo capacity of the containers with the quick cooling method averages about 65% to 70%, depending on the temperature of the fish and type of the fish. This means that a 200 L container accommodates 130 to 140 kg of fish.

QUALITY

Why is it so important to cool down the fish immediately after the catch?

Even though there can be a difference as to fish caught in different seasons, it will always be of best quality coming directly from the ocean. The factor which determines how long a fish will keep it's freshness, depends upon how quickly it can be chilled and at what temperature it is stored.

Research with garfish have shown, that if they are chilled immediately to 0°C and stored at the same temperature they will keep for 9-10 days, whereas if the icing is delayed for 7 hours, they will only keep 3-4 days.

Even a short delay of 4-6 hours on deck, during which the fish

are exposed to sun and wind will result in distorted fish, which even the best cold storage cannot restore.

HANDLING

During the first experiment which took place in 1980 a crane was used to unload on land, which was either mounted to a truck or directly onto the wharf.

When the research vessel is equipped with it's own derrick and winch, loading and unloading take place independently of facilities on land.

The hatches are opened, and the lifting gear is lowered to the container where it grabs the indentations on the container. When lifting takes place, it squeezes around the box.

The problem with respect to unloading is not in lifting but in swinging the container onto land. When the container is swung over the side of the vessel, the vessel will naturally heave. It has appeared feasible that a vessel of this size and dimension can swing a fully loaded container of 200 L onto the dock. However, this is reaching the limits of what is possible. The ship cannot handle a 450 L container on it's own; for this purpose a crane on land is necessary.

HATCHES

The vessel was delivered from the shipyard with three hatches made

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out of plywood and fiberglass. The hatches were constructed in such a way that the front and rear ones close over the middle hatch. They were extremely solid, but during the research period it appeared that they were quite difficult to handle. A new set of hatches of light alloy were therefore constructed later on. The old hatches were replaced by three new ones, which can be opened individually. Apart from this, each individual hatch is hinged in the middle, so that one side may be opened without removing the entire hatch. This is of great advantage^{for} loading ice or fish onto the individual containers.

Simultaneously a large U-clamp was mounted all the way around the opening of the container well. The hatches fit into this large U-clamp and then close tightly in order that no dirt or water may enter the cargo.

HANDLING ON LAND

When the containers holding the catch have been unloaded onto the wharf, fork lift trucks can take over the loading and unloading. 70 L fits one pallet, 2 containers of 200 L also fit one pallet, however, if the 450 L container is being used, it is delivered complete with a pallet; this way all three sizes can be handled by the fork lift truck.

WHAT IS THE COST^{OF} BUILDING SUCH A VESSEL?

With respect to the research vessel, it is obvious that it

was considerably more expensive than the ordinary Sea Rover. All research work cost money; e.g. it cost a great deal of money to manufacture the container well, nevertheless, it is now ready and can be used repeatedly.

After the completion of this research project, several conclusions were made, which have enabled the new vessels of this type to be built considerably cheaper.

It has been discussed with the ship yard how much it will cost to build the new vessel, with the understanding that the same motor of (120 HP) is installed. A vessel built for container cargo could be delivered for the same price as a Sea Rover containing a well. The cost of the Sea Rover would be about 300.000 Kr. However, added to this amount there is an extra cost for the derrick.

The system which has been developed possibly could be used not only for the Sea Rover. Many boats operate with one cargo compartment which is not easily accessible and therefore not utilized. It will probably be feasible to install a container well in these vessels.

As to the containers, these are not included in the price. A single 200 L insulated container is priced at approximately 900 Kr. If these containers become important for the Danish fishing industry, it is to be expected - which is the case with boxes - that it will be the marketing co-operative or auctions that will purchase the containers. This way large purchases can be carried out, which usually changes the price to the advantage of the purchaser. The cost of the containers will therefore not strain the economy of

the individual fisherman.

PERSPECTIVES

Large fishing vessels (50-200 BRT) often haul for 7-10 days. Fish being unloaded from these vessels are kept at a low temperature and are generally accepted as good quality fish.

The trials showed that it is possible to keep the catch at a temperature as low as the one maintained on board the big vessels, perhaps even lower. This makes it possible to undertake longer fishing trips even with small vessels, or, what is more practical, to use the containers for storage of fish. This way large shippings can take place from small docks to a central fish auction. As the containers are well insulated, no cold storage trucks are needed for this transportation; just ordinary open trucks can be used.

The project here described succeeded in developing a vessel especially made for container cargo. It was shown that there are significant possibilities of improving catch handling in the Danish inshore fishing industry. In view of this, it should be possible to improve the quality of consumer fish and thereby increase the earnings of the individual fisherman.

Page 10, photograph no 1.

The research vessel starts to fish

Page 10, photograph no 2.

From the research in 1980 - the solution with the hydraulic crane mounted on the truck.

Page 11, photograph no 1.

Flatfish are being cleaned by the dressing table.

Page 11, photograph no 2.

The hatches are open and a 200 l container is being lifted out.

Page 12, photograph no 1.

Quick cooling of flatfish in a 200 l container

Page 12, photograph no 2.

The catch is heaved on board by use of the derrick.

Page 13, photograph no 1.

By using the derrick a container of 70 l is easily swung onto a dock of considerable height.

Page 13, photograph no 2.

The new light alloy hatches provide better access to the individual containers